

Vitellaro, Chandra

From: Fairchild, Susan
Sent: Thursday, February 18, 2016 4:54 AM
To: Johnson, Steffan
Cc: Narvaez, Madonna; Doolan, Stephanie; McClintock, Katie; davis.george@deq.state.or.us; McCullough, Hugh
Subject: RE: do you know a hexavalent chromium expert in OAQPS?
Attachments: Mechanisms of chromium emissions from Wool Fiberglass Furnaces Final.pdf

Susan Fairchild
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From: Johnson, Steffan
Sent: Thursday, February 18, 2016 7:29 AM
To: Fairchild, Susan <Fairchild.Susan@epa.gov>
Subject: FW: do you know a hexavalent chromium expert in OAQPS?

Susan,

Of particular interest to this conversation might be your experience/information regarding oxy fuel furnaces, temperature, and hex chrome emissions.

I'm uncertain if you have enough information to know whether or not it was hex-chrome coming off the refractories, or whether the temp/combustion conditions in the furnace forced that to convert to Cr6+, but if I recall, there was a strong correlation with temp and hex chrome.

Food for thought.

Stef

I am attaching the paper I drafted and that the team reviewed here for the use of others working on this issue.

It is my understanding that the furnaces at the Portland art glass plant (Uroboros) do not use chromium refractories.

However, they use chromium oxide, a pigment, which flashes off quickly, and ferrochromite, an iron-chromium mineral which does not flash off readily.

Instead of the glass having the capacity below the glass/metal line to absorb chromium coming off the refractory, the glass is being produced by the melting of raw minerals (not cullet), and coloring minerals (in this case, chromium minerals to produce green) may be used in excess amounts to achieve maximum saturation. So, in an uncontrolled situation, all the excess would be driven off, and the energy in the system is more than adequate to drive the chromium conversion to the hexavalent form.

Having said that, it is theory only, and based on my limited understanding of these particular furnaces and operations. In my opinion, the best way to understand the way these furnaces operate and emit is to just test them. Beyond that it is speculation, based on what we understand about the conversion of trivalent to hexavalent in certain situations.

While we did have issues with M0061, it did speciate well the hexavalent from the trivalent chromium, and we were able to show that the hexavalent portion was upwards of 90% of the total chromium from wool fiberglass oxyfuel (that is, natural gas and oxygen firing) furnaces, and significant levels from air-gas (natural gas and air) furnaces.

However, I thought that the chromium, once in the hexavalent state, remained stable at that state, which is in direct conflict with information you provided earlier this week (and I defer to your expertise on that issue), so I'd like you all to think about that concept and provide additional guidance to Region 10 on the conversion upon cooling.

From: MONRO David [<mailto:MONRO.David@deq.state.or.us>]

Sent: Wednesday, February 17, 2016 5:45 PM

To: Narvaez, Madonna <Narvaez.Madonna@epa.gov>; Doolan, Stephanie <Doolan.Stephanie@epa.gov>; McClintock, Katie <McClintock.Katie@epa.gov>; DAVIS George <DAVIS.George@deq.state.or.us>

Cc: McCullough, Hugh <McCullough.Hugh@epa.gov>; Fairchild, Susan <Fairchild.Susan@epa.gov>; Johnson, Steffan <johnson.steffan@epa.gov>; Pope, Anne <Pope.Anne@epa.gov>; Dewees, Jason <Dewees.Jason@epa.gov>; Merrill, Raymond <Merrill.Raymond@epa.gov>; Werner, Leslye <Werner.Leslye@epa.gov>

Subject: RE: do you know a hexavalent chromium expert in OAQPS?

All – thanks for starting this out. At this point we are planning on meeting with Bullseye on Friday at 2:00 pst. Is there anyone from this groups who is able to join the call and assist with the technical discussion (specifically re: tri to hex emissions potentials from the glass furnace)?

David Monro

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From: Narvaez, Madonna [<mailto:Narvaez.Madonna@epa.gov>]

Sent: Wednesday, February 17, 2016 12:05 PM

To: Doolan, Stephanie; McClintock, Katie

Cc: McCullough, Hugh; Fairchild, Susan; MONRO David; Johnson, Steffan; Pope, Anne; Dewees, Jason; Merrill, Raymond; Werner, Leslye

Subject: RE: do you know a hexavalent chromium expert in OAQPS?

Thanks, Stephanie!

From: Doolan, Stephanie

Sent: Wednesday, February 17, 2016 11:37 AM

To: McClintock, Katie <McClintock.Katie@epa.gov>

Cc: McCullough, Hugh <McCullough.Hugh@epa.gov>; Fairchild, Susan <Fairchild.Susan@epa.gov>; MONRO David (MONRO.David@deq.state.or.us) <MONRO.David@deq.state.or.us>; Narvaez, Madonna <Narvaez.Madonna@epa.gov>; Johnson, Steffan <johnson.steffan@epa.gov>; Pope, Anne <Pope.Anne@epa.gov>; Dewees, Jason <Dewees.Jason@epa.gov>; Merrill, Raymond <Merrill.Raymond@epa.gov>; Werner, Leslye <Werner.Leslye@epa.gov>

Subject: Re: do you know a hexavalent chromium expert in OAQPS?

I'm out of the office today, but can send you the information from our air monitoring efforts. We did monitor for hex chromium with good, low level results. You can make some educated assumptions about how much will be hex, but without data, it's hard to know.

Sent from my iPhone

On Feb 16, 2016, at 11:18 PM, McClintock, Katie <McClintock.Katie@epa.gov> wrote:

Thank you all for your thoughtful help.

Oregon DEQ is having a meeting with Bullseye Glass on Friday specifically about whether they can melt trivalent and/or hexavalent chromium without risks to surrounding people. **They have requested technical support for this meeting.**

The conversation centers around whether the total chromium monitored nearby is likely to trivalent or hexavalent. The ambient total chromium concentration was 71.5 ng/m3 and if even a small fraction of that was hexavalent, that would be concerning. However, from the conversation below it sounds like hexavalent chrome emissions (whether from melting hex chrome or from conversion of tri chrome) may not persist and hex chrome in the ambient air. If this is the case it would be a wonderful sigh of relief for bullseye who already can't make anything with red, orange and yellow (and green was the killing blow).

I am wondering if one or two people from this great group of hex chrome minds could participate in that call Friday and could pre-meet with ODEQ on Thursday. Based on the email traffic today, you all have a lot of knowledge to share with DEQ that would help inform their path forward on chromium.

Please let me know if you are able and if you all decide while I am out on inspections tomorrow, if you could **email David Monro directly as soon as possible** (MONRO.David@deq.state.or.us), that would be perfect!

Thanks.

Katie

From: McCullough, Hugh

Sent: Tuesday, February 16, 2016 1:36 PM

To: Fairchild, Susan <Fairchild.Susan@epa.gov>

Cc: Narvaez, Madonna <Narvaez.Madonna@epa.gov>; Johnson, Steffan <johnson.steffan@epa.gov>; Pope, Anne <Pope.Anne@epa.gov>; Dewees, Jason <Dewees.Jason@epa.gov>; Merrill, Raymond <Merrill.Raymond@epa.gov>; McClintock, Katie <McClintock.Katie@epa.gov>; Werner, Leslye <Werner.Leslye@epa.gov>; Doolan, Stephanie <Doolan.Stephanie@epa.gov>

Subject: Re: do you know a hexavalent chromium expert in OAQPS?

Hello all,

I am no longer with the Region 7 air program, but I agree with the points made by Stef. During the RTR for wool fiberglass, we had a couple sources test their Cr6 emissions at the stack with 0061, and I recall from the field that it was challenging for them to get 'good' run.

R7 also conducted ambient air monitoring over a period of a month or two, but unfortunately I am out for training through April and do not have access to my notes. Stephanie Doolan from the R7 air planning group would probably be the best contact for information regarding the QAAP for that monitoring. I should know, but I can't confirm if the monitoring was for total chrome or if it was speciated. I have ccd Stephanie, as well as my previous supervisor, Leslye Werner.

Hope that helps. If there is anything else I can do to help in my limited capacity while I am away, please let me know.

Hugh

Sent from my iPhone

On Feb 16, 2016, at 4:21 PM, Fairchild, Susan <Fairchild.Susan@epa.gov> wrote:

<image002.gif>

Hugh McCullough 913-551-7191

Susan Fairchild
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From: Narvaez, Madonna
Sent: Tuesday, February 16, 2016 3:46 PM
To: Johnson, Steffan <johnson.steffan@epa.gov>; Pope, Anne <Pope.Anne@epa.gov>
Cc: Fairchild, Susan <Fairchild.Susan@epa.gov>; Dewees, Jason <Dewees.Jason@epa.gov>; Merrill, Raymond <Merrill.Raymond@epa.gov>; McClintock, Katie <McClintock.Katie@epa.gov>
Subject: RE: do you know a hexavalent chromium expert in OAQPS?

What is R7 Hugh's last name?

From: Johnson, Steffan
Sent: Tuesday, February 16, 2016 11:36 AM
To: Narvaez, Madonna <Narvaez.Madonna@epa.gov>; Pope, Anne <Pope.Anne@epa.gov>
Cc: Fairchild, Susan <Fairchild.Susan@epa.gov>; Dewees, Jason

<Deweese.Jason@epa.gov>; Merrill, Raymond <Merrill.Raymond@epa.gov>

Subject: RE: do you know a hexavalent chromium expert in OAQPS?

Madonna,

In my experience hexavalent forms of chromium are not stable when they are emitted from a source. In fact, EPA has put a good bit of effort into developing a test method designed specifically to capture hex-chrome compounds and keep them in hex form until analysis, as other chromium emissions test methods tend to let the chromium convert to trivalent forms. It is also my understanding (though certainly not the final word on the topic at all) that hex chrome emissions are likely to change state to trivalent chrome post-emission. I believe Jason DeWees and Ray Merrill of my group may also have information to add here, and so I am copying them on this e-mail.

The only reliable test approach that I know to quantify in-stack emissions of hex-chrome is to use a test method known as SW-846-0061. This method uses an alkaline reagent to trap hex-chrome and retain it in hexavalent form until the alkaline solution can be analyzed at a lab. The test method is a bit tricky, but if you need to know in-stack emissions we're certainly available to help you walk through development of a test protocol.

As to ambient sampling for hex chrome, I'll let Hugh in R7 tell you what he knows, my experience stops at the stack.

Please let us know if we can be of further assistance.

Stef

From: Narvaez, Madonna

Sent: Tuesday, February 16, 2016 12:26 PM

To: Pope, Anne <Pope.Anne@epa.gov>

Cc: Fairchild, Susan <Fairchild.Susan@epa.gov>; Johnson, Steffan <johnson.steffan@epa.gov>

Subject: do you know a hexavalent chromium expert in OAQPS?

Importance: High

Hi, Anne, Susan and Stef. Hope all is well. I don't know if you have heard about the colored glass manufacturer in Portland that DEQ discovered a cadmium hotspot around the facility. In the course of investigations, we discovered that the facility uses Cr+6 as a dry colorant for the glass. Ambient monitoring showed an average of 71.5 ng/m3 of total chromium. I don't know if Katie McClintock, the R10 enforcement contact has asked you for this information yet. If you can point us towards someone, we would really appreciate it. The company uses both Cr+3 and Cr+6, as well as cadmium and arsenic. In the next round of monitoring, the ODEQ will be monitoring for Cr+6 at the day care center, which is 220 meters from the facility. A cadmium hotspot was also detected close to the Harriet Tubman School. A much smaller colored glass mfg facility is close by.

- Katie McClintock did a cursory search for information on the conversion of trivalent chromium to hexavalent chromium and found little information, all of which was talking about smelting and coating. The research confirmed that the use of trivalent chromium alone can still produce hexavalent chromium, but

found little data on the conversion rate under various circumstances. We need to develop or find an expert who can read more literature and help interpret the data we find in stack tests and ambient monitoring.

Thanks!

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